
Engine fire, Boeing 747-123, December 29, 2004

Micro-summary: This Boeing 747-123 had an engine fire in the #4 engine.


Event Date: 2004-12-29 at 1741 AST


Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: <http://www.nts.gov/>

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).
 2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***
 3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.
 4. Contact us before reproducing or redistributing a report from this anthology. Individual countries have very differing views on copyright! We can advise you on the steps to follow.
-

| | | | | | |
|--|-------------|-------------------------------------|----------------------------------|--------------------------------------|--------|
|  | | NTSB ID: ANC05IA020 | | Aircraft Registration Number: N858FT | |
| | | Occurrence Date: 12/29/2004 | | Most Critical Injury: None | |
| | | Occurrence Type: Incident | | Investigated By: NTSB | |
| Location/Time | | | | | |
| Nearest City/Place Anchorage | State AK | Zip Code 99502 | Local Time 1741 | Time Zone AST | |
| Airport Proximity: Off Airport/Airstrip | | Distance From Landing Facility: 0.5 | | Direction From Airport: 320 | |
| Aircraft Information Summary | | | | | |
| Aircraft Manufacturer Boeing | | Model/Series 747-123 | | Type of Aircraft Airplane | |
| Sightseeing Flight: No | | | Air Medical Transport Flight: No | | |
| Narrative | | | | | |
| Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: | | | | | |
| HISTORY OF FLIGHT | | | | | |
| <p>On December 29, 2004, about 1741 Alaska standard time, a Boeing 747-123 airplane, N858FT, sustained minor damage resulting from an under-cowl fire in the number four engine during initial climb after takeoff from the Ted Stevens International Airport, Anchorage, Alaska. The airplane was being operated as Flight 8445, by Polar Air Cargo of Purchase, New York, as an instrument flight rules (IFR) non-scheduled international cargo flight under Title 14, CFR Part 121, when the incident occurred. The three flight crew members were not injured. Visual meteorological conditions prevailed, and an instrument flight plan was filed. The flight originated at the Ted Stevens International Airport, Anchorage, about 1735, and was bound for the Osan Air Base, Republic of South Korea.</p> | | | | | |
| <p>During a telephone conversation with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) on December 29, the FAA aviation safety inspector who examined the airplane said there was a fire in the number four engine compartment, and that the entire outboard cowl was missing. He said the crew reported a fire alarm indication in the engine during initial climb, and that they reported shutting down the engine and activating the fire extinguishing system. The airplane dumped fuel, returned to Anchorage, and landed without incident.</p> | | | | | |
| <p>During an examination of the airplane by the IIC on December 30, the entire outboard cowl was missing. The inboard cowl had been removed by the maintenance crew. The inside of the inboard cowl had extensive fire damage. The engine also had extensive fire damage, with the most damage in the area of the fuel controller.</p> | | | | | |
| <p>The number four engine was removed from the airplane and taken to a storage warehouse. During a visual inspection of the outboard section of the engine adjacent to the oil cooler, the IIC noticed a misaligned large diameter fuel tube (PW Part No. 772123). The fuel tube had separated from the coupler attaching it to the oil cooler, leaving a gap of about one-half inch. The oil cooler is co-mingled with the fuel flow transducer, and uses the heat-exchange principle to cool engine oil, exchanging heat with high quantity fuel flow. The fuel tube is about one and one-quarter inches in diameter, and has a working pressure of about 200 pounds per square inch. The connection at the oil cooler end of the tube assembly included a ferrule that had been brazed to the fuel tube about one inch from the end of the tube. An elastomeric seal (O-ring) was placed around the tube adjacent to the lip of the ferrule, and both were held in place by a nut that was threaded to an externally threaded fitting. Two safety wires were attached to the nut, one wire from the nut to the fitting, and the second from the nut to a metal tab welded onto the fuel pipe. The wire from the nut to the metal tab was broken at the tab. Separation of the fuel tube assembly connection occurred at the brazed sleeve joint between the ferrule and the fuel tube. The fuel tube was removed from the engine without disturbing the ferrule retaining nut, which was safety-wired to the fitting. The tube assembly was shipped to the NTSB Materials Laboratory in Washington, D. C.</p> | | | | | |
| FACTUAL REPORT - AVIATION | | | | | |
| | | | | | Page 1 |

| | |
|--|-----------------------------|
|  <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p> | NTSB ID: ANC05IA020 |
| | Occurrence Date: 12/29/2004 |
| | Occurrence Type: Incident |

Narrative (Continued)

AIRPLANE INFORMATION


The accident airplane is a Boeing 747-123 (cargo configuration), serial number 20109. At the time of the incident, the number four engine had logged 75,863 service hours, with 2,183 service hours since overhaul.


TEST AND RESEARCH

A detailed examination of the tube assembly was conducted, and revealed that the torque on the retaining nut was so low that, once the safety was removed, the nut was easily removed by hand. The safety wire, attached from the nut to the metal tab, had failed in a typical overstress mode. The ferrule had been brazed to the tube at a distance from the end of the tube significantly greater than that specified by the manufacturer. Visual inspection revealed that the brazing filler material adhered to the tube better than it did to the ferrule. X-ray mapping of both brazed surfaces confirmed that the filler mater adhered more readily to the tube than to the ferrule. Aerospace Material Specification (AMS) 2664F for silver brazing requires eighty percent of the mating surfaces of a joint be joined by filler metal. X-ray mapping suggested that an estimated fifty percent of the ferrule surface, and sixty percent of the tube surface, had been covered by filler material before separation.

ADDITIONAL INFORMATION

The Pratt & Whitney JT9D-7A engine is a discontinued model, and according to the manufacturer, there are about 220 of this model engine still in service worldwide. The fuel pipe in question is no longer in production, and is not used on any other engine model.

| | | | | | | |
|--|--|------------------------------|------------------------------------|---|----------------------|--------------|
|  National Transportation Safety Board FACTUAL REPORT AVIATION | | NTSB ID: ANC051A020 | | | | |
| | | Occurrence Date: 12/29/2004 | | | | |
| | | Occurrence Type: Incident | | | | |
| Landing Facility/Approach Information | | | | | | |
| Airport Name | | Airport ID: | Airport Elevation | Runway Used | Runway Length | Runway Width |
| Ted Stevens International Airp | | PANC | Ft. MSL | 32 | | |
| Runway Surface Type: Unknown | | | | | | |
| Runway Surface Condition: Unknown | | | | | | |
| Type Instrument Approach: NONE | | | | | | |
| VFR Approach/Landing: Precautionary Landing | | | | | | |
| Aircraft Information | | | | | | |
| Aircraft Manufacturer | | Model/Series | | Serial Number | | |
| Boeing | | 747-123 | | 20109 | | |
| Airworthiness Certificate(s): Utility | | | | | | |
| Landing Gear Type: Retractable - Tricycle | | | | | | |
| Homebuilt Aircraft? No | | Number of Seats: 8 | Certified Max Gross Wt. 750000 LBS | | Number of Engines: 4 | |
| Engine Type: | | Engine Manufacturer: | | Model/Series: | Rated Power: | |
| Turbo Fan | | Pratt & Whitney | | JT9D-7A | 44000 LBS | |
| - Aircraft Inspection Information | | | | | | |
| Type of Last Inspection | | Date of Last Inspection | Time Since Last Inspection | | Airframe Total Time | |
| Continuous Airworthiness | | | Hours | | Hours | |
| - Emergency Locator Transmitter (ELT) Information | | | | | | |
| ELT Installed? Yes | | ELT Operated? No | | ELT Aided in Locating Accident Site? No | | |
| Owner/Operator Information | | | | | | |
| Registered Aircraft Owner | | Street Address | | | | |
| POLAR AIR CARGO INC | | 2000 Westchester Ave. | | | | |
| | | City | | State | Zip Code | |
| | | New York | | NY | 10577 | |
| Operator of Aircraft | | Street Address | | | | |
| Same as Reg'd Aircraft Owner | | Same as Reg'd Aircraft Owner | | | | |
| | | City | | State | Zip Code | |
| | | | | | | |
| Operator Does Business As: Polar Air Cargo | | | | Operator Designator Code: P5CA | | |
| - Type of U.S. Certificate(s) Held: | | | | | | |
| Air Carrier Operating Certificate(s): Cargo; Flag Carrier/Domestic | | | | | | |
| Operating Certificate: | | | Operator Certificate: | | | |
| Regulation Flight Conducted Under: Part 121: Air Carrier | | | | | | |
| Type of Flight Operation Conducted: Non-scheduled; International; Cargo | | | | | | |
| FACTUAL REPORT - AVIATION | | | | | | |

| | |
|--|-----------------------------|
|  <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p> | NTSB ID: ANC051A020 |
| | Occurrence Date: 12/29/2004 |
| | Occurrence Type: Incident |

First Pilot Information

| | | | | |
|-----------------|-----------------|------------------|--------------------------|-----------|
| Name On File | City On File | State On File | Date of Birth On File | Age 54 |
|-----------------|-----------------|------------------|--------------------------|-----------|

| | | | |
|--------|----------------|-----------------------|-----------------------------|
| Sex: M | Seat Occupied: | Principal Profession: | Certificate Number: On File |
|--------|----------------|-----------------------|-----------------------------|

Certificate(s): Airline Transport; Foreign

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

| | |
|---|---|
| Type Rating/Endorsement for Accident/Incident Aircraft? | Current Biennial Flight Review? 10/2004 |
|---|---|

| | | |
|------------------------|--|------------------------------------|
| Medical Cert.: Class 1 | Medical Cert. Status: With Waivers/Limitations | Date of Last Medical Exam: 11/2004 |
|------------------------|--|------------------------------------|

| - Flight Time Matrix | All A/C | This Make and Model | Airplane Single Engine | Airplane Multi-Engine | Night | Instrument | | Rotorcraft | Glider | Lighter Than Air |
|-----------------------|---------|---------------------|------------------------|-----------------------|-------|------------|-----------|------------|--------|------------------|
| | | | | | | Actual | Simulated | | | |
| Total Time | 24000 | 16000 | | | | | | | | |
| Pilot In Command(PIC) | 11000 | 11000 | | | | | | | | |
| Instructor | | | | | | | | | | |
| Last 90 Days | 161 | 161 | | | | | | | | |
| Last 30 Days | 74 | 74 | | | | | | | | |
| Last 24 Hours | | | | | | | | | | |

| | | | |
|----------------|------------------------|--------------------------|-------------------|
| Seatbelt Used? | Shoulder Harness Used? | Toxicology Performed? No | Second Pilot? Yes |
|----------------|------------------------|--------------------------|-------------------|

Flight Plan/Itinerary

| | | | | |
|------------------------------------|-------|--------------------|----------------|-----------|
| Type of Flight Plan Filed: IFR | | | | |
| Departure Point | State | Airport Identifier | Departure Time | Time Zone |
| Same as Accident/Incident Location | | PANC | | AST |
| Destination | State | Airport Identifier | | |
| Osan Air Base | | RKSO | | |


Type of Clearance: IFR

Type of Airspace: Class C

Weather Information

Source of Briefing:
Company; Flight Service Station

Method of Briefing:

| | |
|--|-----------------------------|
|  <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p> | NTSB ID: ANC051A020 |
| | Occurrence Date: 12/29/2004 |
| | Occurrence Type: Incident |

Weather Information

| WOF ID | Observation Time | Time Zone | WOF Elevation | WOF Distance From Accident Site | Direction From Accident Site |
|--------|------------------|-----------|---------------|---------------------------------|------------------------------|
| PANC | 0053 | AST | Ft. MSL | 0 NM | Deg. Mag. |

Sky/Lowest Cloud Condition: Scattered 20000 Ft. AGL Condition of Light: Day

Lowest Ceiling: None Ft. AGL Visibility: 10 SM Altimeter: 30.39 "Hg

Temperature: 18 °C Dew Point: 12 °C Wind Direction: 40 Density Altitude: Ft.

Wind Speed: 7 Gusts: Weather Conditions at Accident Site: Visual Conditions

Visibility (RVR): Ft. Visibility (RVV) SM Intensity of Precipitation:

Restrictions to Visibility: None


Type of Precipitation: None

Accident Information

Aircraft Damage: Minor Aircraft Fire: In-flight Aircraft Explosion: None

Classification: U.S. Registered/U.S. Soil

| - Injury Summary Matrix | Fatal | Serious | Minor | None | TOTAL |
|-------------------------|-------|---------|-------|------|-------|
| First Pilot | | | | 1 | 1 |
| Second Pilot | | | | 1 | 1 |
| Student Pilot | | | | | |
| Flight Instructor | | | | | |
| Check Pilot | | | | | |
| Flight Engineer | | | | 1 | 1 |
| Cabin Attendants | | | | | |
| Other Crew | | | | | |
| Passengers | | | | | |
| - TOTAL ABOARD - | | | | 3 | 3 |
| Other Ground | | | | | |
| - GRAND TOTAL - | | | | 3 | 3 |

| | | |
|--|-----------------------------|--|
|  National Transportation Safety Board FACTUAL REPORT AVIATION | NTSB ID: ANC05IA020 | |
| | Occurrence Date: 12/29/2004 | |
| | Occurrence Type: Incident | |

Administrative Information

Investigator-In-Charge (IIC)
Lawrence R. Lewis

Additional Persons Participating in This Accident/Incident Investigation:

Terrance R Musick
Aviation Safety Inspector
Anchorage, FSDO-03
4510 W. International Airport Rd.
Anchorage, AK 99502